

determine an attitude of vehicle 52. The other necessary inputs may include the position of vehicle 52, GPS almanac information, and receiver to GPS line of sight information. In contrast to the present invention, Lightsey does not describe nor suggest determining an accurate heading of the vehicle wherein the heading represents the direction of travel of the vehicle nor does Lightsey describe or suggest how to obtain accurate heading information from attitude solutions.

Claim 1 recites a method for determining at least one of motion and location parameters of a locomotive, with either end thereof in the lead in the direction of travel of the locomotive, wherein the method comprises “determining an accurate heading of the locomotive...wherein the heading represents the direction of travel of the locomotive.”

Lightsey does not describe nor suggest a method for determining at least one of motion and location parameters of a locomotive, with either end thereof in the lead in the direction of travel of the locomotive, wherein the method includes determining an accurate heading of the locomotive and the heading represents the direction of travel of the locomotive. Specifically, Lightsey does not describe nor suggest a method for determining at least one of motion and location parameters of a locomotive, with either end thereof in the lead in the direction of travel of the locomotive. Rather, Lightsey describes a method for vehicle roll, pitch, and azimuth attitude determination, but does not describe nor suggest determining an accurate heading of the vehicle that represents the direction of travel of the vehicle. Applicants respectfully submit that determining a vehicle roll, pitch, and azimuth attitude is rarely indicative of the heading wherein heading represents the direction of travel of the vehicle, especially one that is out of control or tumbling, but is rather only a means of determining an orientation of the vehicle.

For at least the reasons set forth above, Claim 1 is submitted to be patentable over Lightsey.

Claims 2, 3, and 30 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2, 3, and 30 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 2, 3 and 30 likewise are patentable over Lightsey.

Claim 15 recites an apparatus for determining at least one of motion and location parameters of a locomotive to detect curves and reduce track wear, with either end of the locomotive in the lead in the direction of travel of the locomotive, wherein the apparatus

comprises “a processor configured to determine...an accurate heading of the locomotive...wherein the heading represents the direction of travel of the locomotive.”

Lightsey does not describe nor suggest an apparatus for determining at least one of motion and location parameters of a locomotive to detect curves and reduce track wear, with either end of the locomotive in the lead in the direction of travel of the locomotive, wherein the apparatus includes a processor configured to determine an accurate heading of the locomotive and the heading represents the direction of travel of the locomotive. Specifically, Lightsey does not describe nor suggest an apparatus for determining at least one of motion and location parameters of a locomotive to detect curves and reduce track wear, with either end of the locomotive in the lead in the direction of travel of the locomotive. Rather, Lightsey describes a method for vehicle roll, pitch, and azimuth attitude determination, but does not describe nor suggest determining an accurate heading of the vehicle that represents the direction of travel of the vehicle. Applicants respectfully submit that determining a vehicle roll, pitch, and azimuth attitude is rarely indicative of the heading, or direction of travel, of the vehicle, especially one that is out of control or tumbling, but is rather only a means of determining an orientation of the vehicle.

For at least the reasons set forth above, Claim 15 is submitted to be patentable over Lightsey.

Claims 16, 17, and 31 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 16, 17, and 31 are considered in combination with the recitations of Claim 15, Applicants submit that Claims 16, 17, and 31 likewise are patentable over Lightsey.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1-3, 15-17, 30, and 31 be withdrawn.

The rejection of Claims 4 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Lightsey in view of U.S. Patent No. 4,999,782 (BeVan) is respectfully traversed.

Lightsey is described above. BeVan describes an apparatus for an aircraft area navigation system that provides transitioning from an inbound course 12 to an outbound course 14 of a lateral navigation waypoint. The apparatus determines, in conjunction with the aircraft altitude and angle of the course change, a maximum distance that the aircraft will

deviate from either inbound course 12 or outbound course 14. The maximum distance is used in conjunction with the course change angle to generate a turn radius for a fixed curved transition path to be followed by the aircraft. The turn radius information together with the aircraft ground speed information, determined using aircraft heading from a conventional compass system 29 and true airspeed from a conventional air data system 28, is used to generate a bank angle bias command signal. The bank angle bias command is calculated to vary the bank angle of the aircraft to keep the aircraft on the fixed curved path throughout the transition from outbound course 14 to inbound course 12.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Neither Lightsey nor BeVan, considered alone or in combination, describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine Lightsey with BeVan, because there is no motivation to combine the references suggested in the art. Additionally, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicants' own teaching. Rather, only the conclusory statement that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the equations of heading and heading rate in the claims in the invention of Lightsey because they are the known equations of vector math" suggests combining the disclosures.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Applicants respectfully submit however, that the prior art teaches away from the present invention and from each other. More specifically, Lightsey describes a method for

vehicle roll, pitch, and azimuth attitude determination using GPS carrier phase measurements from nonaligned antennas, and BeVan describes determining aircraft heading from a conventional compass system. Further, at column 19, lines 5-13, Lightsey recites “[t]he benefit of the present invention is that...continuous attitude determination and navigation is provided at all times in orbit, regardless of the pointing mode of the vehicle, even if the vehicle is out of control and tumbling.” Lightsey describes a method of navigation independent of determining an accurate heading wherein the heading represents the direction of travel. In a vehicle that is tumbling, heading does not represent the direction of travel of the vehicle. Lightsey describes a method of navigation that teaches away from the method recited in the present invention. Furthermore, the Office Action asserts that because Lightsey discloses at column 19, Lines 5-13 that the satellite receivers are used in navigation functions that Lightsey also discloses a heading. It is possible to determine a heading with a satellite GPS receiver, as described in the present invention but, Lightsey does not describe or suggest this capability. Lightsey does not describe or suggest how a heading is derived from a satellite receiver. Satellite receivers are used to determine vehicle position independent of heading. Determining vehicle position is a navigation function. Heading without more information cannot be used to determine position. Heading, by itself, is not a navigation function. As Lightsey does not describe or suggest determining a heading wherein heading is the direction of travel, there is no motivation to combine Lightsey with other art to achieve the present invention independent of the teaching of the present invention.

Additionally, BeVan, at column 3, lines 40-45 recites “With the aircraft 14 at the commanded bank angle at point A, the craft heading rate maintains the aircraft on the curved path 15 in an idealized calm air environment.” BeVan does not disclose how to determine the heading and heading rate. Further, at column 6, lines 55-67, BeVan describes how to determine  $T_1$ , where  $T_1$  represents the angular position of the aircraft on the curved path. BeVan, again, does not disclose how to determine the heading and heading rate.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such

reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Because the cited art teaches away from the present invention and from each other, there is no teaching nor suggestion in the cited art for the combination, therefore the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection be withdrawn.

Further, and to the extent understood, neither Lightsey nor BeVan, considered alone or in combination, describe or suggest the claimed combination, and as such, the presently pending claims are patentably distinguishable from the cited combination. More specifically, Claim 4 depends indirectly from independent Claim 1, which recites a method for determining at least one of motion and location parameters of a locomotive, with either end thereof in the lead in the direction of travel of the locomotive, wherein the method comprises “providing at least two satellite signal receivers on the locomotive at spaced locations along the length of the locomotive...determining a set of phase differences between satellite reference signals received by satellite receivers...determining an accurate heading of the locomotive using the set of phase differences between the satellite reference signals, wherein the heading represents the direction of travel of the locomotive.”

Neither Lightsey nor BeVan, considered alone or in combination, describe nor suggest a method for determining at least one of motion and location parameters of a locomotive, with either end thereof in the lead in the direction of travel of the locomotive, wherein the method includes providing at least two satellite signal receivers on the locomotive at spaced locations along the length of the locomotive, determining a set of phase differences between satellite reference signals received by satellite receivers, and determining an accurate heading of the locomotive using the set of phase differences between the satellite reference signals, wherein the heading represents the direction of travel of the locomotive. Specifically, neither Lightsey nor BeVan, considered alone or in combination, describe nor suggest determining an accurate heading of a locomotive using a set of phase differences between satellite reference signals, wherein the heading represents the direction of travel of the locomotive. Rather, Lightsey describes a method for vehicle roll, pitch, and azimuth attitude determination, but does not describe nor suggest determining an accurate heading of

the vehicle that represents the direction of travel of the vehicle. Furthermore, BeVan describes determining aircraft heading from a conventional compass system. For at least the reasons set forth above, Claim 1 is submitted to be patentable over Lightsey.

Claim 4 depends indirectly from independent Claim 1. When the recitations of Claim 4 are considered in combination with the recitations of Claim 1, Applicants submit that Claim 4 likewise is patentable over Lightsey in view of BeVan.

Claim 18 depends indirectly from independent Claim 15, which recites an apparatus for determining at least one of motion and location parameters of a locomotive to detect curves and reduce track wear, with either end of the locomotive in the lead in the direction of travel of the locomotive, wherein the apparatus comprises “at least two phase-locking satellite receivers configured to reference signals received from a set of satellites...a processor configured to determine a set of phase differences between the reference signals received by said satellite receivers and an accurate heading of the locomotive using the set of phase differences between the reference signals, wherein the heading represents the direction of travel of the locomotive.”

Neither Lightsey nor BeVan, considered alone or in combination, describe nor suggest an apparatus for determining at least one of motion and location parameters of a locomotive to detect curves and reduce track wear, with either end of the locomotive in the lead in the direction of travel of the locomotive, wherein the apparatus includes at least two phase-locking satellite receivers configured to reference signals received from a set of satellites, and a processor configured to determine a set of phase differences between the reference signals received by the satellite receivers and an accurate heading of the locomotive using the set of phase differences between the reference signals, wherein the heading represents the direction of travel of the locomotive. Specifically, neither Lightsey nor BeVan, considered alone or in combination, describe nor suggest a processor configured to determine an accurate heading of a locomotive using a set of phase differences between satellite reference signals, wherein the heading represents the direction of travel of the locomotive. Rather, Lightsey describes a method for vehicle roll, pitch, and azimuth attitude determination, but does not describe nor suggest determining an accurate heading of the vehicle that represents the direction of travel of the vehicle. Furthermore, BeVan describes determining aircraft heading from a conventional compass system. For at least the reasons set forth above, Claim 15 is submitted to be patentable over Lightsey in view of BeVan.

Claim 18 depends, indirectly, from independent Claim 15. When the recitations of Claim 18 are considered in combination with the recitations of Claim 15, Applicants submit that Claim 18 likewise is patentable over Lightsey in view of BeVan.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 4 and 18 be withdrawn.

The rejection of Claims 5-9, 12-14, 19-23, 28 and 29 under 35 U.S.C. § 103(a) as being unpatentable over Lightsey in view of U.S. Patent No. 6,218,961 (Gross et al.) is respectfully traversed.

Applicants respectfully submit that Gross et al. and this Application were commonly owned under 35 U.S.C. 103(c) and 37 C.F.R. 1.104(a)(5)(i) at the time of the invention of the present Application was made, the common owner being General Electric Company. G.E. Harris Railway Electronics L.L.C. is wholly owned by General Electric Company, a New York Corporation. Thus, it is submitted that Gross et al. is not available as a reference under 35 U.S.C. 103(a).

For the reason set forth above, Applicants respectfully request that the Section 103 rejection of Claims 5-9, 12-14, 19-23, 28, and 29 be withdrawn.

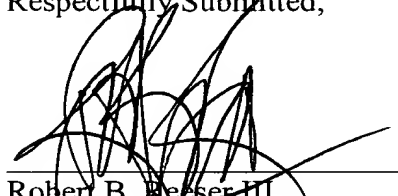
The rejection of Claims 10, 11 and 24-27 under 35 U.S.C. § 103(a) as being unpatentable over Lightsey in view of Gross et al., and further in view of U.S. Patent No. 5,896,947 (Kumar) is respectfully traversed.

Applicants respectfully submit that Gross et al. and this Application were commonly owned under 35 U.S.C. 103(c) and 37 C.F.R. 1.104(a)(5)(i) at the time of the invention of the present Application was made, the common owner being General Electric Company. G.E. Harris Railway Electronics L.L.C. is wholly owned by General Electric Company, a New York Corporation. Thus, it is submitted that Gross et al. is not available as a reference under 35 U.S.C. 103(a).

For the reason set forth above, Applicants respectfully request that the Section 103 rejection of Claims 10, 11 and 24-27 be withdrawn.

In view of the foregoing remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Robert B. Reiser III", is written over a horizontal line.

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